CLAIMS

What is claimed is:

1. A thermochromic composition comprised of at least one color former and at least one Lewis acid introduced into a polymer containing material, wherein said polymer containing material is transparent, or substantially transparent, below a lower critical solution temperature (LCST), said polymer containing material reversibly becoming non-transparent above the lower critical solution temperature.

2. The thermochromic composition as in claim 1, wherein the at least one color former comprises at least one of: Crystal violet lactone; Rhodamine B base; Malachite green lactone; 1,1-(4-dimethylaminophenyl)ethylene; 2,2-bis-(4-dimethylaminophenyl)-1,3-dithiolane; and, Leucocrystal violet cyanide.

3. The thermochromic composition as in claim 1, wherein the at least one Lewis acid comprises at least one of: 3-nitrophenylboronic acid; 3,4-dichlorophenylboronic acid; 4-fluorophenol; 2,4-di-t-butylsalicylaldehyde; 3-methoxyphenylboronic acid; 4-fluorophenylboronic acid; 4-chlororphenylboronic acid; 2,4-difluorophenylboronic acid; and, 9-hydroxyboroxarophenanthrene.

4. The thermochromic composition as in claim 1, wherein the polymer containing material comprises a mixture of poly(methyl vinyl) ether and polystyrene.

5. The thermochromic composition as in claim 1, wherein the at least one color former is selected from the group of color formers comprising: lactone color formers, di(tri)aryl methane carbinol and ether color formers, and diarylethylene color formers.

6. The thermochromic composition as in claim 1, wherein the at least one Lewis acid is selected from the group of Lewis acids comprising: phenols, metal ions and boronic acids.

7. The thermochromic composition as in claim 1, wherein the LCST comprises a temperature between about 100°C to about 150°C.

8. The thermochromic composition as in claim 1, wherein the polymer containing material comprises acrylonitrile-co-α α-methylstyrene and at least one of n-butyl methacrylate-co-methyl methacrylate, ethyl methacrylate, ethyl metracrylate-co-methyl metracrylate and methyl methacrylate.

9. The thermochromic composition as in claim 1, wherein the polymer containing material comprises acrylonitrile-*co*-styrene and at least one of ϵ ϵ -caprolactone and methyl methacrylate.

10. The thermochromic composition as in claim 1, wherein the polymer containing material comprises bisphenol A carbonate (oxycarbonyloxy-1,4-phenylene isopropylidene-1,4-phenylene) and ϵ ϵ -caprolactone.

11. The thermochromic composition as in claim 1, wherein the polymer containing material comprises butyl acrylate and at least one of chlorinated ethylene and vinyl chloride.

12. The thermochromic composition as in claim 1, wherein the polymer containing material comprises butyl methacrylate and 2-(hydroxy hexa-fluorosoisopropyl)styrene-co-styrene.

13. The thermochromic composition as in claim 1, wherein the polymer containing material comprises ϵ ϵ -caprolactone and chlorinated ethylene.

14. The thermochromic composition as in claim 1, wherein the polymer containing material comprises carbon monoxide-co-ethyl acrylate-co-ethylene and vinyl chloride.

15. The thermochromic composition as in claim 1, wherein the polymer containing material comprises cellulose acetate and 4-vinylpyridine.

16. The thermochromic composition as in claim 1, wherein the polymer containing material comprises chlorinated ethylene and at least one of ethylene-co-vinyl acetate and methyl methacrylate.

17. The thermochromic composition as in claim 1, wherein the polymer containing material comprises chlorinated isoprene and ethylene-co-vinyl acetate.

18. The thermochromic composition as in claim 1, wherein the polymer containing material comprises chlorinated vinyl chloride and at least one of chlorinated vinyl chloride and vinyl chloride.

19. The thermochromic composition as in claim 1, wherein the polymer containing material comprises o-chlorostyrene and styrene.

20. The thermochromic composition as in claim 1, wherein the polymer containing material comprises o-chlorostyrene-co-p-chlorostyrene and 2,6-dimethyl-1,4-phenylene oxide styrene.

21. The thermochromic composition as in claim 1, wherein the polymer containing material comprises p-chlorostyrene-co-o-fluorostyrene and 2,6-dimethyl-1,4-phenylene oxide.

22. The thermochromic composition as in claim 1, wherein the polymer containing material comprises chlorosulfonated ethylene and vinyl chloride.

23. The thermochromic composition as in claim 1, wherein the polymer containing material comprises 2,6-dimethyl-1,4-phenylene oxide and at least one of o-fluostyrene-*co*-p-fluorostyrene, o-fluorostyrene-*co*-styrene, and, p-fluorostyrene-*co*-styrene.

24. The thermochromic composition as in claim 1, wherein the polymer containing material comprises dodecamethylene decamethylene dicarboxylate and vinyl chloride.

25. The thermochromic composition as in claim 1, wherein the polymer containing material comprises dodecamethylene dodecamethylene dicarboxylate and vinyl chloride.

26. The thermochromic composition as in claim 1, wherein the polymer containing material comprises ethyl acrylate and vinylindene fluoride.

27. The thermochromic composition as in claim 1, wherein the polymer containing material comprises ethyl methacrylate and at least one of 2-(hydroxy-hexafluoro-isopropyl) styrene-co-styrene, vinyl chloride-co-vinylidene chloride, and vinylidene fluoride.

28. The thermochromic composition as in claim 1, wherein the polymer containing material comprises ethylene-co-vinyl acetate and vinyl chloride.

29. The thermochromic composition as in claim 1, wherein the polymer containing material comprises ethylene oxide and oxyphenylene-sulfonyl-phenylene.

30. The thermochromic composition as in claim 1, wherein the polymer containing material comprises hexadecamethylene dodecamethylene dicarboxylate and vinyl chloride.

31. The thermochromic composition as in claim 1, wherein the polymer containing material comprises 2-(hydorxy-hexafluoroisopropyl) styrene-co-styrene and at least one of methyl methacrylate and vinyl methyl ether.

32. The thermochromic composition as in claim 1, wherein the polymer containing material comprises methyl acrylate and vinylidene fluoride.

33. The thermochromic composition as in claim 1, wherein the polymer containing material comprises methyl methacrylate and at least one of vinyl chloride, vinyl chloride-*co*-vinylidene chloride and vinylidene fluoride.

34. The thermochromic composition as in claim 1, wherein the polymer containing material comprises neopentyl adipate and at least one of oxy-2-hydroxytrimethylene-1,4-phenyleneisopropylidene-1,4-phenylene (phenoxy resin) and vinyl chloride-*co*-vinylide chloride.

35. The thermochromic composition as in claim 1, wherein the polymer containing material comprises oxycarbonyloxy-2,6-dimethyl-1,4-phenyleneisopropylidene-3,5-dimethyl-1,4 phenylene and styrene.

36. The thermochromic composition as in claim 1, wherein the polymer containing material comprises n-propyl methacrylate and vinyl chloride-*co*-vinylidene chloride.

37. The thermochromic composition as in claim 1, wherein the polymer containing material comprises styrene and vinyl methyl ether.

38. The thermochromic composition as in claim 1, wherein the polymer containing material comprises vinyl methyl ketone and vinylidene fluoride.

39. A method for producing a thermochromic composition, comprising:

heating a first mixture comprising a first polymer;

dissolving a second polymer into the first mixture, wherein the first mixture, when dried, is transparent, or substantially transparent, below a lower critical solution temperature (LCST), and becomes reversibly non-transparent above the LCST;

mixing a color former solution with a Lewis acid solution to produce a second mixture;

adding the second mixture to the first mixture to form the thermochromic composition.

40. The method as in claim 39, wherein the first mixture comprises benzene.

41. The method as in claim 40, further comprising removing the benzene from the first mixture and adding toluene to the first mixture as the benzene is removed.

42. The method as in claim 39, wherein the color former solution comprises a mixture of at least one color former and tetrahydrofuran.

43. The method as in claim 39, wherein the Lewis acid solution comprises a mixture of at least one Lewis acid and methanol.

44. The method as in claim 39, further comprising:

shaping and drying the thermochromic composition to form a thermochromic film.

45. The method as in claim 39, wherein the first polymer comprises an aqueous solution of poly(methyl vinyl) ether.

46. The method as in claim 39, wherein the second polymer comprises a mixture of polystyrene dissolved in toluene.

47. The method as in claim 39, comprising removing water from the first mixture once reflux has been reached.